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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/674,415	02/05/2001	Evgeny Invievich Givargizov	GIVAR5.001 A	8472

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EXAMINER

NEGRON, ISMAEL

ART UNIT	PAPER NUMBER
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2875

DATE MAILED: 10/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/674,415

Applicant(s)

GIVARGIZOV ET AL 

Examiner

Ismael Negron

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 51-88 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 51-88 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on February 5, 2001 has been entered. No claims have been amended. Claims 1-50 have been cancelled. Claims 51-88 have been added. Claims 51-88 are still pending in this application, with claims 51, 67, 69, 78 and 82 being independent.

Applicant is advised that while the amendment states claims 51 to 93 as being added, only claims 51-88 were actually included in the amendment papers as filed.

Title

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: **Electron sources with Whisker Field Emitters, and Method of Manufacturing.**

Abstract

3. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Applicant is reminded of the proper content of an abstract of the disclosure.

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A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The applicant is further reminded of the proper language and format for an abstract of the disclosure.

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The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Drawings

4. Figures **1**, **2a**, **2b**, **3a**, **3b** and **3c** should be designated by a legend such as -- Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "**04**" has been used to designate both "*first p-n junction*"

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(page 2, line 40) and "*barrier*" (page 7, line 1). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

In addition, note the following:

- reference character "**01**", used to designate "*top of field emitter*" (page 7, line 1) and "*whisker-grown field emitter*" (page 8, line 9);
and
- reference character "**09**", used to designate "*control electrode*" (page 7, line 2), "*conductive strips*" (page 7, line 25) and "*conducting substrate*" (page 8, line 9).

The applicant is advised that the reference characters must be properly applied, with no single reference character being used for two different parts or for a given part and a modification of such part. See MPEP §608.01(g). Correction is required.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "**01**" has been used to designate different parts in different embodiments. See Figures 3a and 4a-4e. Correction is required.

In addition, note the following:

- reference character "**02**" in Figures 6a and 6b;
- reference character "**03**" in Figures 3a, 3b, 4b, 5a, 5b and 6a;
- reference character "**04**" in Figures 3a, 4a-4e, 5a-5d, 6a, 6b and 7;
- reference character "**06**" in Figures 3a and 4a.

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7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: **110, 120, 130, 140, 150, 160, 170, 180** in Figure 2a, and **210, 220, 230, 240, 250, 270, 280** of Figure 2a. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

8. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "*ballast resistor*" (claims 51, 67 and 69) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. In addition, note the following:

- a "*barrier*" being formed within the conductive layer of the substrate (claim 53);
- the body of the field emitter "*being a whisker epitaxial to the substrate*" (claims 51 and 82);
- the body of the field emitter being "*configured as a blade*" (claim 67).

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

9. Applicant is further advised that this action only exemplifies the objections to the drawings, applicant's cooperation is requested in correcting all the occurrences of the cited, or any other errors of which applicant may become aware in the specification.

Specification

10. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.

(b) CROSS-REFERENCE TO RELATED APPLICATIONS.

(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH
OR DEVELOPMENT.

(d) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON
A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05.
Computer program listings (37 CFR 1.96(c)), "Sequence Listings"
(37 CFR 1.821(c)), and tables having more than 50 pages of text
are permitted to be submitted on compact discs.) or

REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a).

"Microfiche Appendices" were accepted by the Office until March 1, 2001.)

(e) BACKGROUND OF THE INVENTION.

(1) Field of the Invention.

(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.

(f) BRIEF SUMMARY OF THE INVENTION.

(g) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).

(h) DETAILED DESCRIPTION OF THE INVENTION.

(i) CLAIM OR CLAIMS (commencing on a separate sheet).

(j) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).

(k) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A

"Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

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11. The spacing of the lines of the specification is such as to make reading and entry of amendments difficult. New application papers with lines double spaced on good quality paper are required.

12. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph.

Claim Rejections - 35 USC § 112

First Paragraph

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

13. Claims 51-88 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification fails to disclose how are the different parts of the invention related to one another, or how they interact together. In addition, the method claims merely state forming the necessary

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parts of the claimed invention without first disclosing, in the specification or drawings, how is such forming actually accomplished.

In addition, it is noted that the body of the specification does not support the claims, since it does not includes a detailed description of the claimed invention, but a general statement of intention.

Second Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 51- rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 51 is indefinite as it is not clear how are the different elements of the claimed invention related to one another.

Claim 51 is indefinite as it is not clear if the claimed invention includes different materials in the field emitter (or proximate to it), or not.

Claim 57 is indefinite as it is not clear what the applicant intended to claim with the limitation semiconductor materials with opposite conductivity types.

Claims 59 and 60 are indefinite as it is not clear what the applicant intended to cover with the use of the phrase "*diamond-like material*". The interpretation of the cited phrase is made more difficult since the specification is silent as to what characteristic of such "*diamond-like material*" are critical to the claimed invention.

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Claim 61 is indefinite as it is not clear with respect to what frame of reference are the "*inner part*" and "*outer part*" defined.

Claim 67 is indefinite as it is not clear how are the different elements of the claimed invention related to one another.

Claim 67 is indefinite as it is not clear if the claimed invention includes semiconductor materials in the field emitter (or proximate to it), or not.

Claim 69 is indefinite as it is not clear if the claimed invention includes materials with opposite conductivity in the field emitter (or proximate to it), or not.

Claim 78 is indefinite as it is not clear how are the different elements of the claimed invention related to one another.

Claims 52-56 and 62-66 are rejected for their dependency on rejected claim 51.

Claim 68 is rejected for its dependency on rejected claim 67.

Claims 70-77 are rejected for their dependency on rejected claim 69.

Claims 83-88 are rejected for their dependency on rejected claim 82.

15. While applicant may be his or her own lexicographer, a term in a claim may not be given a meaning repugnant to the usual meaning of that term. See *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947). The term "*whisker*" in claim 1 is used by the claim to mean "cone," while the accepted meaning is "a thin hair-like crystal structure." In addition, note claims 82-84 and 86-88, where the term "*whisker*" is used in the same way as in claim 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 51-53, 55, 56, 58, 61-66 and 82-88 are rejected under 35 U.S.C. 102(b) as being anticipated by Borel et al. (U.S. Pat. 4,940,916).

Borel et al. discloses an electron source having :

- **a substrate**, Figure 4, reference number 5;
- **a field emitter**, Figure 4, reference number 12;
- **the body of the field emitter being a cone epitaxial to the substrate**, column 1, lines 46-49;
- **a source of charge carriers supplying the field emitter**, Figure 4, reference number 20;
- **at least one ballast resistor**, Figure 4, reference number 24;
- **the ballast resistor being configured as a barrier between different materials located near, or in the field emitter**, column 6, lines 19-37;
- **the substrate includes an insulating layer**, Figure 4, reference number 4;
- **the substrate also including a conductive layer**, Figure 4, reference number 22;

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- **at least one barrier formed within the conductive layer, Figure 4;**
- **the barrier being formed at least in part by an insulating layer that is perpendicular to the charge carrier flow, Figure 4;**
- **the field emitter including at least one semi-conductor material, inherent;**
- **an end of the field emitter having a narrow tip, Figure 4;**
- **the field emitter having to coaxial parts, one narrow outer part and a broad inner part, Figure 4;**
- **an insulating layer at least part way in between the conducting layer and the surface of the field emitter, Figure 4; and**
- **the source of charge carriers being the conducting layer, Figure 4.**

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 54, 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Borel et al. (U.S. Pat. 4,940,916).

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Borel et al. discloses an electron source having :

- **a substrate**, Figure 4, reference number 5;
- **a field emitter**, Figure 4, reference number 12;
- **the body of the field emitter being a cone epitaxial to the substrate**, column 1, lines 46-49;
- **a source of charge carriers supplying the field emitter**, Figure 4, reference number 20;
- **at least one ballast resistor**, Figure 4, reference number 24;
- **the ballast resistor being configured as a barrier between different materials located near, or in the field emitter**, column 6, lines 19-37; and
- **an end of the field emitter having a narrow tip**, Figure 4.

Borel et al. discloses all the limitations of the claims, except the substrate being a mono-crystalline substrate with 111 orientation, or the tip of the emitter being sharpened and diamond coated.

It would have been an obvious matter of design choice to use a mono-crystalline substrate with (111) orientation, since the applicant has not disclosed that such feature solves any problem or is for a particular reason. It appears that the claimed invention would perform equally well with the field emitter structure as disclosed by Borel et al..

In addition, the Examiner takes Official Notice that the use of diamond coated field emitters is old and well known in the art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use diamond coated field

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emitters in the system of Borel et al.. One would have been motivated since diamond coated field emitters are recognized in the illumination art to have superior electrical and mechanical characteristics, such as high carrier mobility, wide band gap, high thermal conductivity, mechanical hardness and multi-spectral transparency.

17. Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Borel et al. (U.S. Pat. 4,940,916).

Borel et al. discloses an electron source having :

- **a substrate**, Figure 4, reference number 5;
- **a field emitter**, Figure 4, reference number 12;
- **the body of the field emitter being a cone epitaxial to the substrate**, column 1, lines 46-49;
- **a source of charge carriers supplying the field emitter**, Figure 4, reference number 20;
- **at least one ballast resistor**, Figure 4, reference number 24;
- **the ballast resistor being configured as a barrier between different materials located near, or in the field emitter**, column 6, lines 19-37.

Borel et al. discloses all the limitations of the claims, except the body of the field emitter being configured as a blade.

It would have been an obvious matter of design choice to include a blade-shaped emitter in the device of Borel et al., as opposed to the disclosed cone-shaped emitter,

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since the applicant has not disclosed that specifically a blade-shaped emitter solves any problem or is for a particular reason. By applicant's own admission, blade-shaped field emitters are old and well known in the art, and selection of the emitter shape is based on the particulars of each application. See the specification as filed, page 1, lines 10-16.

18. Claim 78-81 is rejected under 35 U.S.C. 103(a) as being unpatentable over Borel et al. (U.S. Pat. 4,940,916).

Borel et al. discloses an electron source having :

- **a substrate**, Figure 4, reference number 5;
- **a field emitter**, Figure 4, reference number 12;
- **the body of the field emitter being a cone epitaxial to the substrate**, column 1, lines 46-49;
- **a source of charge carriers supplying the field emitter**, Figure 4, reference number 20;
- **at least one ballast resistor**, Figure 4, reference number 24;
- **the ballast resistor being configured as a barrier between different materials located near, or in the field emitter**, column 6, lines 19-37.

Borel et al. discloses all the limitations of the claims, except a two-dimensional matrix system formed by a plurality of field emitters.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made that the primary purpose of the field emitter structure disclosed by Borel et al. was to create a display panel (as implied in column 1, lines 7-15), such display panel being a two-dimensional matrix (as implied in column 1, lines 22-46). In addition, it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

Regarding the use of diamond coating, the Examiner takes Official Notice that the use of diamond-coated field emitters is old and well known in the art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use diamond coated field emitters in the system of Borel et al.. One would have been motivated since diamond coated field emitters are recognized in the illumination art to have superior electrical and mechanical characteristics, such as high carrier mobility, wide band gap, high thermal conductivity, mechanical hardness and multi-spectral transparency.

Allowable Subject Matter

19. Claim 69 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

20. Claims 70-77 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

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21. The following is a statement of reasons for the indication of allowable subject matter:

Applicant teaches an electron source having a substrate with a field emitter extending from its surface. The field emitter includes a side surface with an insulating layer covering at least a portion of such surface.

No prior art was found teaching individually, or suggesting in combination, all of the features of the applicants' invention, specifically the field emitter with an at least partially covered side surface.

Relevant Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

William (U.S. Pat. 3,772,556), **Sandhu** (U.S. Pat. 5,151,061), **Gray** (U.S. Pat. 5,214,347), **Hirano et al.** (U.S. Pat. 5,780,318), **Macaulay et al.** (U.S. Pat. 5,851,669), **Xu et al.** (U.S. Pat. 5,973,444), **Blanchert-Fincher et al.** (U.S. Pat. 6,020,677), **Nakamoto** (U.S. Pat. 6,097,138), **Alwan** (U.S. Pat. 6,121,721) and **Hsu et al.** (U.S. Pat. 6,333,598) disclose field emitters for displays.

Non-Patent documents **Curtin**, **Corrigan et al.**, **Kwon et al.**, **Gunth r et al.** and **Hajra et al.** provide basis for the "old and well known in the art" status of diamond-coated field emitters.

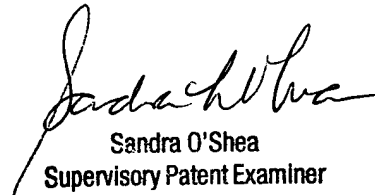
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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ismael Negrón whose telephone number is (703) 308-6086. The examiner can normally be reached on Monday-Friday from 9:00 A.M. to 6:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra L. O'Shea, can be reached on (703) 305-4939. The facsimile machine number for the Art Group is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.


Sandra O'Shea
Supervisory Patent Examiner
Technology Center 2800

Inr

September 25, 2002